PROBLEMS

2.1. **Temperature measuring system—MATLAB**

The op-amp circuit shown in Figure 2.19 is used to measure the changes of temperature in a system. The output voltage is given by

$$v_o(t) = -R(t)v_i(t)$$

Suppose that the temperature in the system changes cyclically after $t = 0$, so that

$$R(t) = [1 + 0.5\cos(20\pi t)]\,u(t)$$

Let the input be $v_i(t) = 1$ volt.

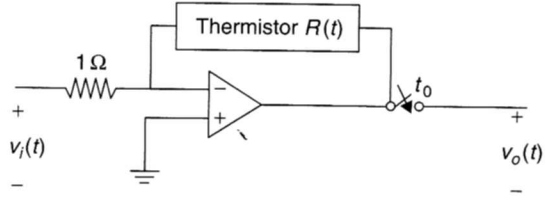

FIGURE 2.19
Problem 2.1.

(a) Assuming that the switch closes at $t_0 = 0$ sec, use MATLAB to plot the output voltage $v_o(t)$ for $0 \leq t \leq 0.2$ sec in time intervals of 0.01 sec.

(b) If the switch closes at $t_0 = 50$ msec, plot the output voltage $v_0(t)$ for $0 \leq t \leq 0.2$ sec in time intervals of 0.01 sec.

(c) Use the above results to determine if this system is time invariant. Explain.